Field Sampling Plan Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, Transformer Yard (CFA-10)

1. OVERVIEW

This Field Sampling Plan (FSP) presents the rationale and procedures for data collection efforts for the Waste Area Group (WAG) 4, Operable Unit (OU) 4-13 Transformer Yard (CFA-10) Remedial Design/Remedial Action (RD/RA) work plan activities (DOE-ID 2000d). The Central Facilities Area (CFA)-10 remedial site is located at the CFA at the Idaho National Engineering and Environmental Laboratory (INEEL). The sampling activities support the implementation of the selected remedy for the site, which is identified in the *Final Comprehensive Record of Decision for Central Facilities Area Operable Unit 4-13* (DOE-ID 2000b).

This FSP was developed in accordance with the *Health and Safety Plan (HASP) Idaho National Engineering and Environmental Laboratory Central Facilities Area, Operable Unit 4-13 Transformer Yard (CFA-10)* (INEEL 2000) and the *Quality Assurance Project Plan (QAPjP) for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2000c), which is made a part of this document by reference.

1.1 Field Sampling Plan

This FSP will guide the collection and analysis of samples that will be collected during remedial action at the CFA-10 Transformer Yard. The selected remedy identified in the Final OU 4-13 Record of Decision (ROD) for the CFA-10 Transformer Yard (DOE-ID 2000b) is Excavation and Off-INEEL Treatment by Stabilization and Disposal. Based on the data quality objectives developed for the sampling, data needs exist to guide the excavation of soil materials, determine the proper disposition of excavated materials, and provide verification sampling to ensure the final remediation goal (FRG) of 400 mg/kg lead for the site has been met. For this project, a best management goal of 170 mg/kg has been identified to address a potential ecological risk due to lead.

For CFA-10, the ROD identified lead as a contaminant of concern that poses a threat to human health and the environment. Lead was detected in the surface soil at a maximum concentration of 5,560 mg/kg, which exceeds the U.S. Environmental Protection Agency's (EPA's) residential screening criterion of 400 mg/kg. The ROD also identified copper as a contaminant of concern, posing a threat to ecological receptors. However, as indicated in the ROD, copper contamination was detected in the surface soil where lead contamination was identified. Therefore, the remedial action for lead contamination is expected to also remediate the copper.

The ROD indicates that the extent of lead contamination exceeding 400 mg/kg at the CFA-10 Transformer Yard encompasses the dimensions of the Transformer Yard and is confined to a depth of 0.15 m (0.5 ft). The volume of lead-contaminated soil is estimated to be 123 m^3 (161 yd^3).

1.2 Project Organization and Responsibility

The project organization and personnel positions associated with this remedial action are identified in Section 2 of the OU 4-13 Transformer Yard HASP (INEEL 2000).

1.3 Points of Contact

Table 11-4 of the OU 4-13 Transformer Yard HASP identifies the points of contact for this field sampling plan.

2. WORK SITE BACKGROUND

The INEEL is a government-owned reservation managed by the U.S. Department of Energy Idaho Operations Office (DOE-ID). First established as the National Reactor Testing Station and renamed the Idaho National Engineering Laboratory in 1949, the INEEL is located in southeast Idaho on the Eastern Snake River Plain and occupies an area of approximately 2,305 km^2 (890 mi^2). The laboratory's original mission focused on building, testing, and operating nuclear facilities. The U.S. Navy and U.S. Army Air Corps used a portion of the site at the CFA from the early 1940s to the 1950s for gunnery and bombing ranges. In 1997, the name was again changed to the Idaho National Engineering and Environmental Laboratory to reflect the emphasis on environmental operations.

Historically, facilities at the INEEL were dedicated to the development and testing of peaceful applications of nuclear power. Waste disposal practices from these operations resulted in contamination of some facilities and the surrounding environment. Throughout the 50 years of INEEL operations, disposal practices have been implemented in compliance with state and federal regulations and policies established by the U.S. Department of Energy and its predecessors. Some of these practices are not acceptable by current standards and have been discontinued. In keeping with the contemporary emphasis on environmental issues, INEEL research is now focused on environmental restoration to address contaminated media and waste management issues to minimize additional contamination from current and future operations.

The CFA is located in the south-central portion of the INEEL. The CFA has been used since 1949 to house many of the support services for all of the operations at the INEEL, including laboratory, security, fire protection, medical, communication systems, warehouses, a cafeteria, vehicle and equipment pools, bus system, and laundry facilities. The facilities have been modified over the years to fit changing needs and currently provide four types of functional space: craft, office, service, and laboratory.

Under the *Federal Facility Agreement and Consent Order* (DOE-ID 1991), CFA was designated as WAG 4. WAG 4 consists of 52 surface sites grouped into 13 operable units. The Transformer Yard (CFA-10) is a part of OU 4-09 within OU 4-13. OU 4-09 consisted of sites with similar contamination. OU 4-13 was the final comprehensive investigation for WAG 4 identified in the FFA/CO.

2.1 Work Site Description and Background

The Transformer Yard (CFA-10) is approximately 19.8 m × 42 m (65 ft × 138 ft) and has a 6.1-m (20-ft) concrete pad, which extends through the width of the yard, as shown in Figure 2-1. A shallow ditch crosses the pad and runs the length of CFA-10 in a general southeast to northwest direction. The pad was installed between 1962 and 1964 and was used from 1985 to 1990 as a temporary storage location for transformers that may have contained polychlorinated biphenyls (PCBs). However, there were no documented or suspected leaks or spills from the transformers.

The Transformer Yard was also used as a welding shop from approximately 1958 to 1985. Reportedly, welding activities were often performed outside the building on the ground, and a recent investigation has identified areas of visible surface lead debris within the Transformer Yard (DOE-ID 2000d). Waste from the welding shop may have included small amounts of solvents, along with chromium, cadmium, lead, zinc, and nickel. Process knowledge indicates that the Transformer Yard was not routinely used to dispose of waste, although some accidental spills of solid metals may have occurred.

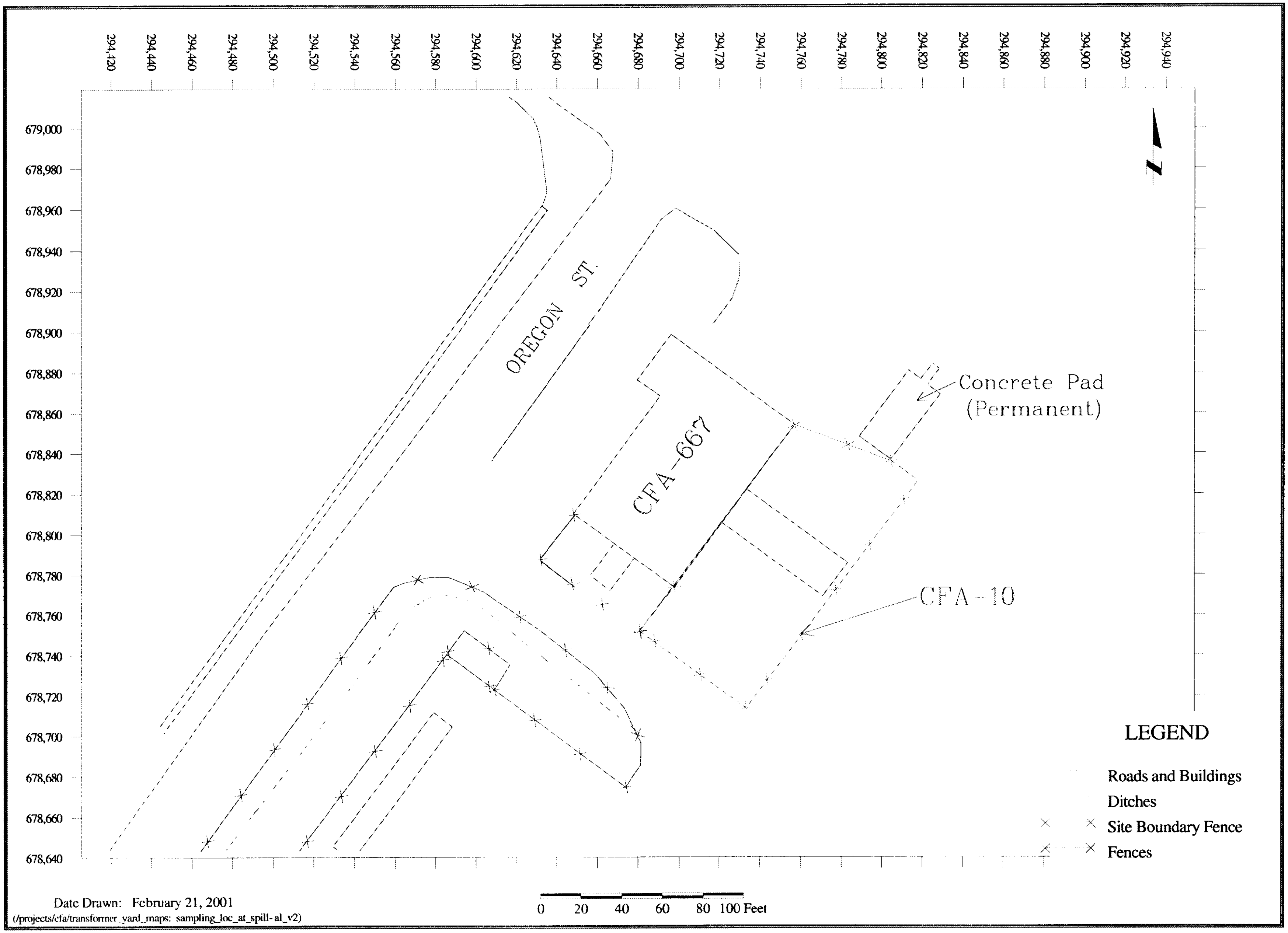

Figure 2-1. Location of the Transformer Yard at CFA.

2.2 Previous Investigations

2.2.1 Radiation Survey (1991)

A radiation survey conducted at CFA-10 in 1991 detected no radiological activity in the surface soils, as summarized in the Preliminary Scoping Track 2 Summary Report (INEL 1996).

2.2.2 Track 2 Investigation (1995)

In 1995, the Track 2 investigation focused on characterization of potential contamination by metals and PCBs (INEL 1996). Six surface soil samples (0 to 0.15-m [0 to 0.15-ft] below ground surface) were collected and analyzed for PCBs with field screening techniques (some samples were sent to an offsite laboratory for analysis). All positive detections of PCBs were below 2 mg/kg, which is less than the Toxic Substances Control Act PCB screening concentration of 25 mg/kg for conditional industrial sites. Four surface soil samples collected and sent offsite for toxicity characteristic leaching procedure (TCLP) metal analysis exhibited lead and arsenic at levels above background concentrations.

An initial contaminant screening was performed in the OU 4-13 Work Plan using the Track 2 data. This screening identified the following contaminants as contaminants of potential concern (COPCs): arsenic, lead, Aroclor-1254, and Aroclor-1260. The results of the supplemental contaminant screen conducted as a part of the Remedial Investigation/Baseline Risk Assessment identified lead, Aroclor-1254, and Aroclor-1260 as COPCs to be retained for further evaluation in the Baseline Risk Assessment. Detected concentrations of arsenic were determined not to be source related and were assumed to be within the range of background concentrations for INEEL soils. Therefore, arsenic was eliminated as a COPC.

2.2.3 Remedial Investigation/Feasibility Study (1998)

In 1998, during the OU 4-13 Comprehensive Remedial Investigation/Feasibility Study, soil samples were collected at four locations for total lead and TCLP lead analyses (DOE-ID 2000a). At each location, samples were collected at the surface (0 to 0.15 m [0 to 0.5 ft]) and at depths 0.3 m (1.0 ft) and 0.6 m (2.0 ft). The average lead concentration for the surface soils was 1,589 mg/kg, and the highest concentration of lead was 5,560 mg/kg. Average lead concentrations for the deeper samples were 64 mg/kg at 0.3 m (1.0 ft) and 18 mg/kg at 0.6 m (2.0 ft). The background lead concentration, based on grab samples from the INEEL, is 23 mg/kg. Only the average lead concentration for the surface soil exceeds the EPA's residential lead screening level of 400 mg/kg. Additionally, samples collected from the three depths at the four locations were analyzed by the TCLP for lead; two surface samples exceeded the TCLP level for lead.

2.2.4 X-Ray Fluorescence Survey (2000)

In October of 2000, a field survey of the Transformer Yard was conducted to determine the extent of lead contamination (DOE-ID 2000d). A Niton X-Ray Fluorescence (XRF) instrument was used to measure lead concentrations. The Transformer Yard was divided into 3 by 3-m (10 by 10-ft) squares beginning at a point 21-m (70-ft) north of the northeast corner of the building. Grid columns extended north and south, parallel to the building, and grid rows ran east and west, perpendicular to the building. The south and east part of the Transformer Yard were only randomly surveyed. Approximately 10 points were selected in each grid. The shaded areas of Figure 2-2, which depicts the data, indicate areas that had survey points that exceeded the FRG of 400 mg/kg lead. The majority of the survey points exceeding the FRG of 400 mg/kg was identified to be adjacent to the building on the east side. The measured contaminant concentrations decreased in concentration and/or in number of survey points exceeding 400 mg/kg as the distance from the building increased. This was true in all instances with the exception of areas noted by visual observation, which consisted of large masses of lead scattered sporadically throughout the site.

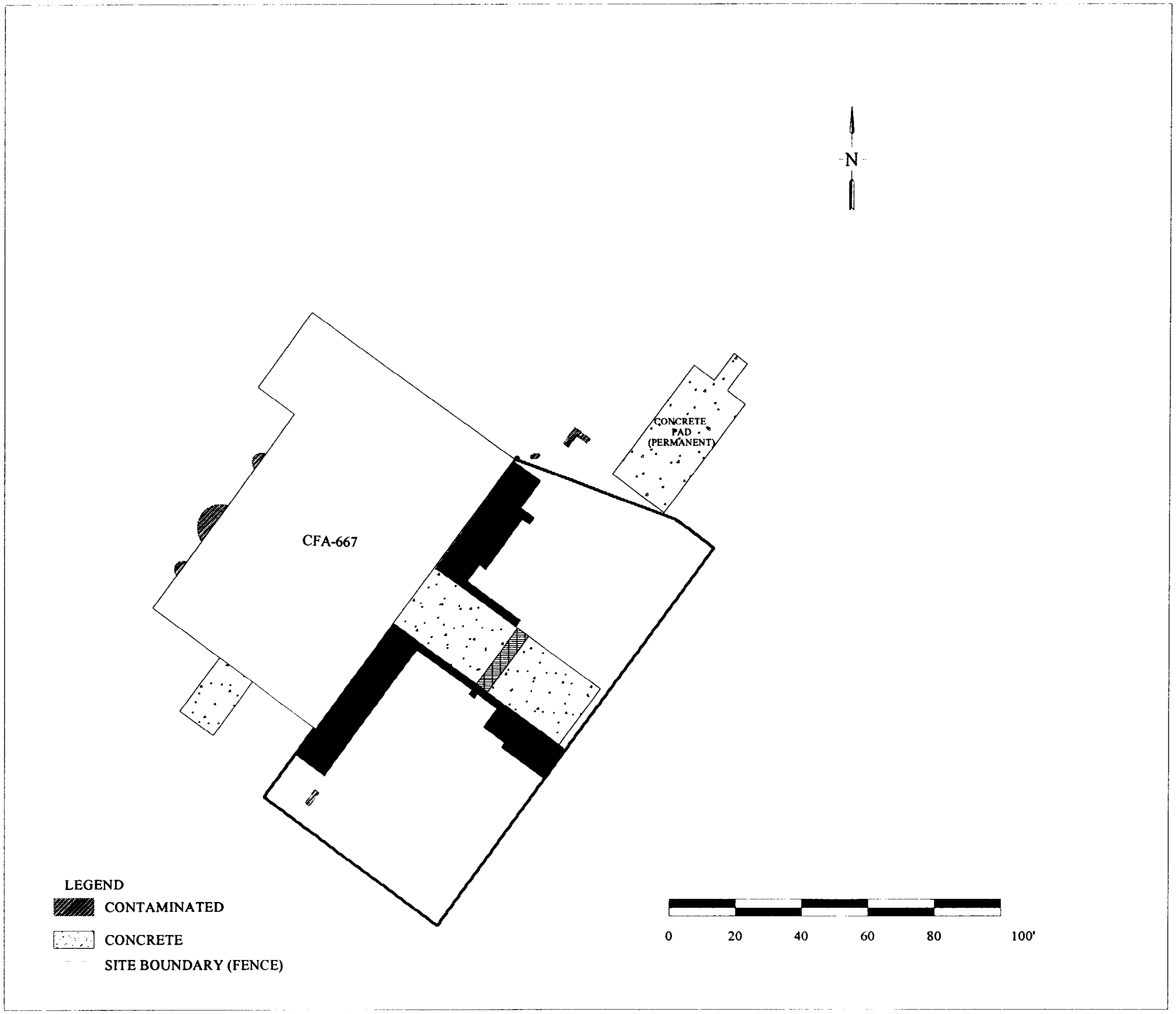

Figure 2-2. Map of XRF Survey results demonstrating lead-contaminated areas.

3. SAMPLING OBJECTIVES

The following sections define data needs and data quality objectives for conducting the proposed sampling at CFA-10. Data needs have been determined through the evaluation of existing data and application of the seven-step data quality objectives process as outlined by the Environmental Protection Agency (EPA 1994).

3.1 Data Needs

Data collection activities outlined in this FSP will guide the excavation of soils, determine proper disposition of excavated materials, and verify that remaining soils do not exceed the FRG of 400 mg/kg as specified in the ROD, which would allow site closure. These activities address the decision statements listed in Table 3-1 that are relevant to CFA-10.

Table 3-1. Decision statements for CFA-10.

1	Determine whether soils exceed the FRG of 400 mg/kg and require excavation.
2	Determine whether the concrete pad and soils exceed the TCLP limit of 5 mg/L and require stabilization and disposition to an off-INEEL Treatment, Storage, and Disposal Facility (TSDF) or do not exceed the TCLP of 5 mg/L and can be disposed at the CFA landfill.
3	Determine whether remaining soils after remediation meet the FRG of 400 mg/kg and support site closure.

Additional soil exceeding 170 mg/kg may be removed in order to remove potentially unacceptable ecological risk concerns at the discretion of the project team.

This FSP can be divided into three sampling phases: preremediation, remediation, and postremediation. A further description of each phase is provided below. Data needs and analytical performance requirements are summarized in Table 3-2.

3.1.1 Preremediation

Preremediation activities consist of sampling that will occur prior to excavation. The objective of this sampling is to confirm areas within the Transformer Yard that exceed lead concentrations of 400 mg/kg and to obtain information that will help determine proper disposition of materials. Soils will be sampled for total and TCLP lead analyses, and the concrete pad will be sampled for TCLP lead analysis. All preremediation sampling will go through the Sample Management Office (SMO) and be sent to an approved laboratory.

Sample results exceeding 400 mg/kg will confirm areas requiring excavation that were previously identified in the October 2000 XRF survey of CFA-10 (DOE-ID 2000d). Waste generated from the site will be dispositioned based on the TCLP results exceeding 5 mg/L to an off-INEEL TSDF, and materials below this limit can be disposed at the CFA landfill.

Soil sample locations are discussed in Section 4. However, a brief rationale for the preremediation sampling locations is provided here. The Transformer Yard was divided into rectangular sections that were based on XRF results from the October 2000 field survey of CFA-10 (EDF-ER-2000). The size and location of the designated sections within the Transformer Yard were based on the frequency of lead readings exceeding 400 mg/kg.

Within each designated section, three grab samples will be collected to form a single composite sample. This composite soil sample will be submitted for total and TCLP lead analyses. Additionally, one sample of the concrete pad (at the location specified in Section 4) will be collected and submitted for TCLP analysis. The rationale behind the location was to select an area of the pad that was close to an area in the Transformer Yard that exhibited high concentrations of lead. One sample is considered to be representative of the entire concrete pad, because it is assumed that the worst case sample for the pad will be collected.

3.1.2 Remediation

Remediation sampling will consist only of collecting total lead data from soils after excavation has begun. The objective of this sampling is to determine whether future excavation of soils is required. The XRF will be used as a field screening technique to make this determination. If soils are found to exceed project team goals or the FRG, excavation will occur as specified in the RD/RA Work Plan (DOE-ID 2000d).

3.1.3 Postremediation Data Collection Activities

Postremediation sampling activities will consist of collection and preparation of verification samples and analysis. Sample locations are specified and discussed in Section 4, and details regarding the XRF procedures are provided in Section 6.

Table 3-2. OU 4-13 Transformer Yard (CFA-10) FSP inputs needed to develop decision rules (i.e., data needs) summary.

Sampling Phase	Data Need	Objective/Data Use	Action Level	Analytical Method	PQL[a]/Precision/ Accuracy
DECISION STATEMENT #1: DETERMINE WHETHER SOILS EXCEED THE FRG OF 400 MG/KG AND REQUIRE EXCAVATION.					
Pre-remediation Remediation	Total Lead Total Lead	To determine and verify which soils exceed the FRG of 400 mg/kg. This will determine which materials require excavation.	400 mg/kg	Preremediation: Laboratory analyses using SW-846 methods Remediation: Use of field screening with XRF	100 mg/kg/ ±30 / 70–130%
DECISION STATEMENT #2: DETERMINE WHETHER SOILS AND CONCRETE PAD EXCEED THE TCLP LIMIT OF 5 MG/L AND REQUIRE STABILIZATION AND DISPOSITION TO AN OFF-INEEL TSDF OR DO NOT EXCEED THE TCLP LIMIT OF 5 MG/L AND CAN BE DISPOSED AT THE CFA LANDFILL.					
Pre-remediation Post-remediation	TCLP Lead	To determine whether the soils exceed TCLP limits for lead. This will determine proper disposition of materials and identify whether treatment is required.	5 mg/L	Pre- and Post-remediation: Laboratory analyses using SW-846 methods	1 mg/L / ±30 / 70–130%
DECISION STATEMENT #3: DETERMINE WHETHER REMAINING SOILS AFTER REMEDIATION MEET THE FRG OF 400 MG/KG AND SUPPORT SITE CLOSURE.					
Post-remediation	Total Lead TCLP Lead	To confirm that the site has been effectively remediated to 400 mg/kg and to identify and resample excavated areas that exceeded TCLP in the pre-remediation sampling. This will determine whether the site can be closed and provide further waste disposition information.	400 mg/kg 5 mg/L	Postremediation: Laboratory analyses using SW-846 methods.	100/± 30/70–130% 1 mg/L/± 30/70–130%

a. PQL = practical quantitation limit/level

3.2 Sample Design

Preremediation sampling uses a nonstatistical judgmental design. These sample locations, discussed in Sections 3 and 4 of this document, are based on XRF screening data discussed in the X-Ray Fluorescence Survey (EDF-ER-2000). The maximum lead concentrations obtained from data will be used as comparison criteria to determine whether a section requires further excavation and to provide data to guide the dispositioning of the wastes.

Remediation sampling will occur over the Transformer Yard area and will identify areas requiring further excavation. A statistically-based sample design was used to determine the locations for the postremediation verification sampling. The final number of samples was calculated using the "Formulae for calculating the sample size needed to estimate the mean." This equation, based on a maximum cleanup level of 170 mg/kg, a standard deviation of 1/3 of the maximum cleanup level, identified that 20 verification samples would be required to statistically prove the site was cleaned to a 95% level of confidence. The final cleanup level is 400 mg/kg, as specified in the ROD. Further details regarding the rationale and basis for this design are provided in Appendix C.

3.3 Quality Assurance Objectives for Measurement

The quality assurance objectives for measurement will meet or surpass the minimum requirements for data quality indicators established in the QAPjP (DOE-ID 2000c). This section applies to only the verification postremediation samples that will go through SMO for analysis and receive data validation.

Precision, accuracy, and completeness will be calculated pursuant to the QAPjP. While the variability associated with sampling cannot be eliminated, variability can be minimized by using quality control samples. The recommendations described in the QAPjP for minimum field quality control samples will be followed.

3.3.1 Precision and Accuracy

Laboratory precision and accuracy are part of the data validation criteria against which the results are evaluated. Precision is a measurement of the reproducibility of a measurement under a given set of conditions. The analytical method will meet the laboratory precision specified in the QAPjP. Accuracy measures the bias in a measurement system and is difficult to measure for the entire data collection activity. Accuracy is a function of the sampling technique used in the field and the analytical methods of the laboratory. Field accuracy will be controlled through the design and execution of the FSP sample collection techniques. Laboratory accuracy will be determined through the techniques discussed in the QAPjP.

3.3.2 Representativeness

The objective of addressing representativeness involves assessing whether information obtained during the investigation accurately represents actual site conditions. Representativeness is a qualitative parameter that expresses the degree to which the sampling and analytical data accurately and precisely reflect the characteristic of a population, the parameter variations at a sampling point, or an environmental condition. Representativeness will be evaluated by determining whether measurements are made and physical samples are collected in such a manner that the resulting data appropriately measure the media and phenomenon measured or studied. The comparison of laboratory analytical data sets obtained throughout this remedial action will be used to ensure representativeness.

3.3.3 Completeness

The completeness of the data is a comparison of the number of samples collected and analyzed to the number of samples planned. Completeness is a function of field sampling factors and analytical factors as discussed in the QAPjP. As the postremediation verification samples are considered to be critical samples for determination of the site meeting specified goals, a completeness goal of 90% is identified.

3.3.4 Detection Limits

Instrument detection limits must meet the decision-based concentrations for the contaminant of concern. The cleanup standard for CFA-10, specified in the ROD, is 400 mg/kg. Detection limits for all analytical methods must meet the specified criteria. Detection limits will be set as specified in the SMO laboratory Master Task Agreement statements of work, task order statements of work, and as described in the QAPjP.

3.4 Data Validation

Data will be acquired, processed, and controlled prior to input to the Integrated Environmental Data Management System (IEDMS) per management control procedure (MCP)-227, *Sampling and Analysis Process for Environmental Management Funded Activities*. Preremediation samples will receive a Tier 1 data package and will not be validated. Postremediation verification samples will receive a Tier 1 data package, and samples will be validated to a Level B.

Data Limitation and Validation report will be generated, which includes copies of the chain-of-custody forms, the sample results, and the validation flags. All Data Limitation and Validation reports associated with this RD/RA Work Plan remedial action activity will be transmitted to the EPA and the Idaho Department of Environmental Quality within 120 days from the last day of sample collection.

3.5 Quality Assurance/Quality Control Samples for CFA-10

Duplicate samples will be collected at a rate of one for every 20 samples or one per day, whichever is least. Duplicate samples will receive separate sample numbers and will be collected within 0.5 meters of each other. The validation report will include a record of the locations and results of the analysis of duplicate and samples.

If dedicated or disposable equipment (discussed in Section 6) will not be used, equipment rinsate blanks will be required to ensure field decontamination procedures are adequate. The recommended minimum frequency is 1/day/matrix or 1/20 environmental samples, whichever is less. Field blanks will not be collected, as they are recommended for samples collected for radiological analyses, and the QAPjP does not recommend trip blanks for soils samples.

4. SAMPLING LOCATION AND FREQUENCY

4.1 Sampling Locations

4.1.1 Preremediation Sampling

The Transformer Yard was divided into ten sections, as identified in Figure 4-1. Three locations are identified in each section. Each location represents a grab sample that will form a single composite sample per section that will be submitted through the SMO for total and TCLP lead analysis. All sections will be treated this way with the exception of Section 10, the concrete pad. Only one sample, the middle sample, of the pad will be submitted for TCLP analysis, and soil samples under the concrete pad will be collected and submitted for total and TCLP lead analysis. Appendix B provides northing and easting coordinates for the identified locations. As discussed in Section 3.1.1, the selection of sections within the Transformer Yard was based on data from the XRF survey of CFA-10 conducted in November 2000.

The determination of the three sample locations in each section, if in areas with identified contamination (Figure 2-2), was biased toward areas with contamination, otherwise were evenly distributed. The location of the concrete sample was based on proximity of soils that exhibited high concentrations of lead. Sample locations will be determined in the field in accordance with the locations in Figure 4-1. Soil samples will be collected at a depth of 0 to 0.076 m (0 to 0.50 ft) for all sections and 0.30 to 0.38 m (1 to 1.5 ft) for Sections 1, 2, 5, and 6. The full depth of the concrete pad sample will be collected, and the results will provide data for excavation purposes and disposition of excavated materials.

4.1.2 Remediation Sampling

Location of remediation sampling areas will be left to the discretion of the field team leader and will include consideration of the preremediation sampling results. Any areas identified as exceeding project team goals will be further excavated as specified in the RD/RA Work Plan.

4.1.3 Postremediation Sampling

There are 20 locations identified for postremediation sampling. These locations are identified in Figure 4-2, and northing and easting coordinates are provided in Appendix B. Once the remediation sampling indicates that total lead levels are below the FRG and/or the best management goal, samples will be collected. Samples will be collected from the postremediation sampling locations specified in the SAP tables (the locations were randomly identified) and will be collected and sent through SMO to a laboratory for total lead analysis. Additionally, two random location samples from those sections in the preremediation sampling phase that exceeded the lead TCLP limit of 5 mg/L will be specified for TCLP lead analysis. If applicable, it will be left to the discretion of the field team leader whether the appropriate verification samples also require TCLP lead analysis.

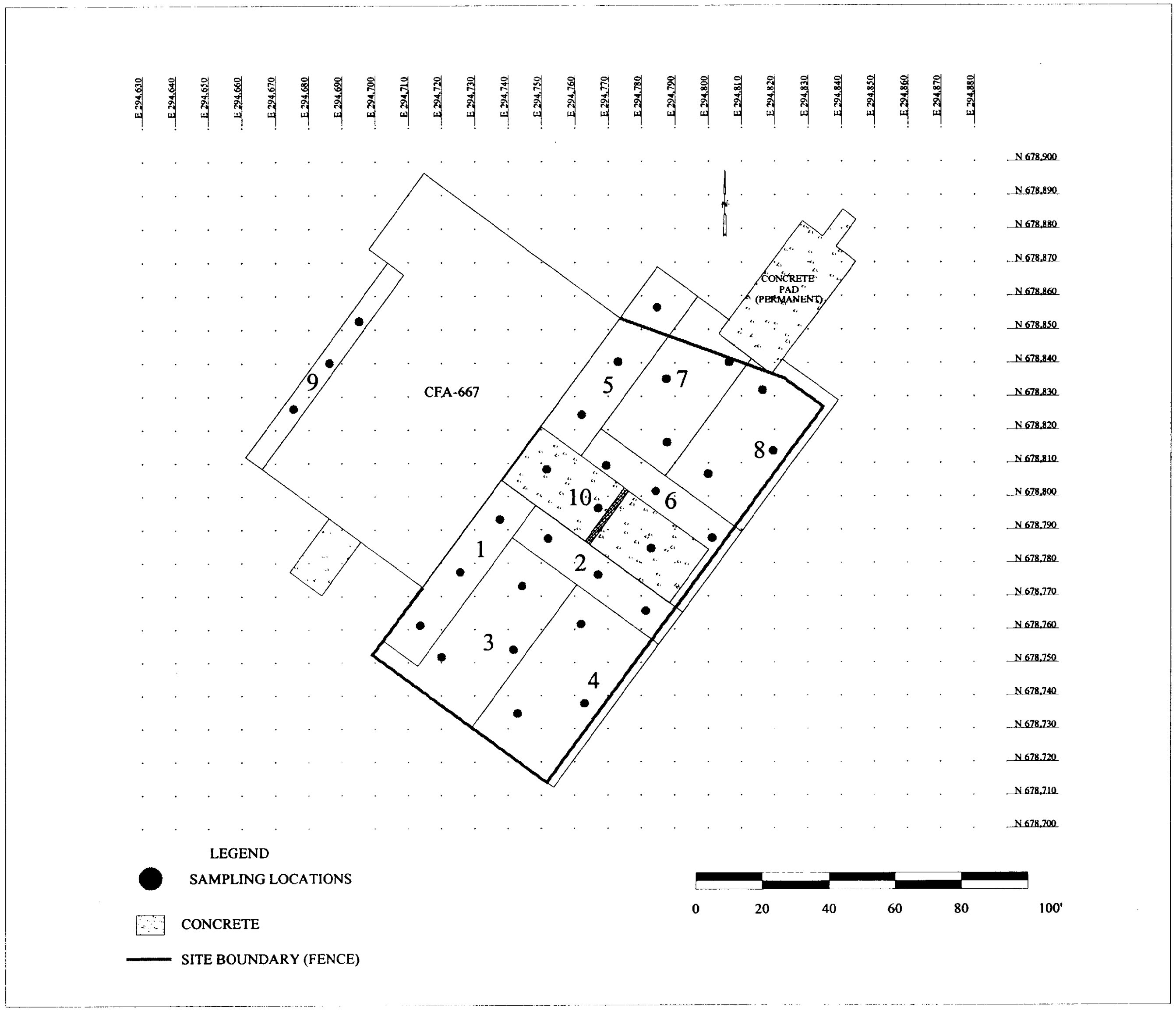

Figure 4-1. Sample locations for preremediation sampling.

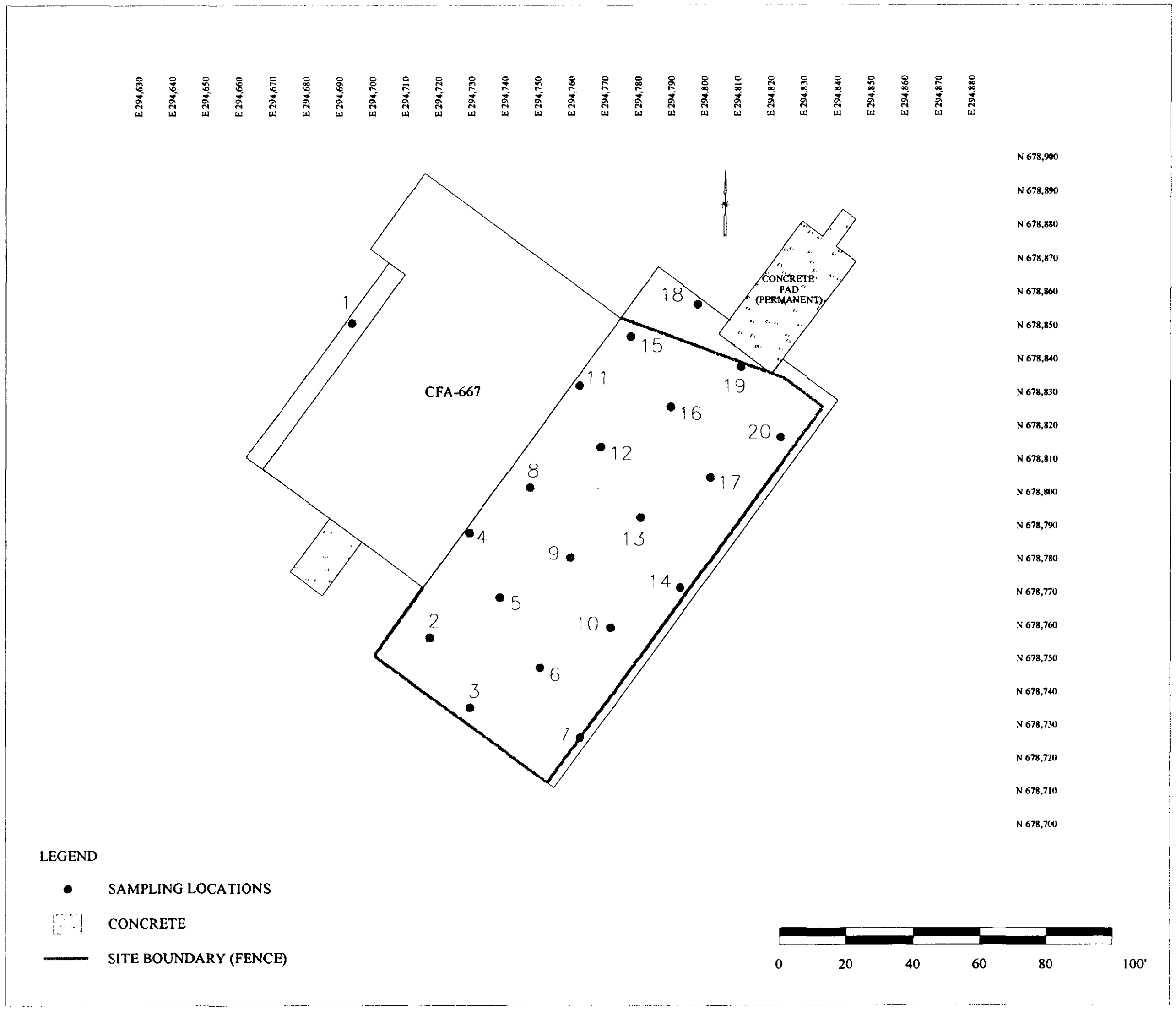

Figure 4-2. Sample locations for postremediation sampling.

5. SAMPLING DESIGNATION

5.1 Sample Identification Code

A random character identification (ID) code made up of 10 characters will be used to uniquely identify all samples. Uniqueness is required for maintaining consistency and preventing the same ID code from being assigned to more than one sample.

The first designator of the code, 4, refers to the sample originating from WAG 4. The second and third designators, 13, refer to the sample being collected in support of remedial action activities. The next three numbers designate the sequential sample number for the project. A two-character set (e.g., 01, 02) will be used to designate field duplicate samples. The last two characters refer to a particular analysis and bottle type. The SAP tables in Appendix A display the first six characters of the sample identification number; the complete number will appear on field guidance forms and sample labels.

For example, a sample collected in support of the sampling activities might be designated as 41300101, where (from left to right):

- **4** designates the sample as originating from WAG 4
- **13** designates the sample as being collected for OU 4-13 activities
- **001** designates the sequential sample number (001–099 for preremediation samples at CFA-10, 100–199 for remediation and postremediation samples at CFA-10)
- **01** designates the type of sample (01 = original, 02 = field duplicate).

The IEDMS database will be used to record all pertinent information associated with each sample ID code. Preparation of the plan database and completion of the SMO request for services initiates the sample and sample waste tracking activities performed by the SMO.

5.2 Sampling and Analysis Plan Table/Database

5.2.1 General

A SAP table format was developed to simplify the presentation of the sampling scheme for project personnel. The following sections describe the information recorded in the SAP tables presented in Appendix A.

5.2.2 Sample Description Fields

The sample description fields contain information relating to individual sample characteristics.

5.2.2.1 Sampling Activity. The sampling activity field contains the first six characters of the assigned sample number. The entire sample number will be used to link information from other sources (field data, analytical data, etc.) to the information in the SAP tables for data reporting, sample tracking, and completeness reporting. The analytical laboratory will also use the sample number to track and report analytical results.

5.2.2.2 Sample Type. Data in this field will be selected from the following:

REG	for a regular sample
QC	for a quality control sample.

5.2.2.3 *Media. Data in this field will be selected from the following:*

Soil	for soil samples
Concrete	for concrete sample
Water	for quality assurance/quality control samples.

5.2.2.4 *Collection Type.* Data in this field will be selected from the following:

GRAB	for grab
COMP	for composite
SPLIT	for split samples
FBLK	for field blanks
RNST	for rinsates
DUP	for duplicate samples.

5.2.2.5 ***Planned Date.*** This date specifies the planned sample collection start date.

5.2.3 Sample Location Fields

The sample location fields group pinpoints the exact location for the sample in three-dimensional space, starting with the general AREA, narrowing the focus to an exact LOCATION geographically, and then specifying the DEPTH in the depth field.

5.2.3.1 ***Area.*** The AREA field identifies the general WAG (Central Facilities Area, Idaho Nuclear Technology and Engineering Center, etc.) sample-collection area. The AREA field will contain the standard identifier from the INEEL area being sampled. For this project, the AREA field will identify CFA.

5.2.3.2 ***Location.*** The LOCATION field may contain geographical coordinates, x-y coordinates, building numbers, or other identifying details as well as program-specific information, such as a borehole or well number. Data in this field will normally be subordinated to the AREA. This information is included on the labels generated by the SMO to aid sampling personnel.

5.2.3.3 ***Type of Location.*** The TYPE OF LOCATION field supplies descriptive information concerning the exact sample locations. Information in this field may overlap that in the location field, but it is intended to add detail to the location.

5.2.3.4 ***Depth.*** The DEPTH of a sample location is the distance in feet from surface level or a range in feet from the surface.

5.2.3.5 ***Matrix/Media.*** The matrix for a sample will be entered as "soil" or "liquid" based on the sample.

5.2.4 Analysis Type (AT1 through AT20)

The ANALYSIS TYPE fields indicate analytical types (radiological, chemical, etc.). Space is provided at the bottom of the form to clearly identify each type. A standard abbreviation should also be provided, if possible.

6. SAMPLING PROCEDURES

The following sections describe the sampling procedures to be used for the sampling and analyses described in this FSP. Prior to any sampling activities, a presampling meeting will be held. Meeting activities will include, but not be limited to, the following:

- Review of the requirements of the FSP and HASP
- A check for completeness of all supporting documentation
- Review of sample activity for the day
- Discussion of responsibility of team members and safety issues.

6.1 Surveying and Staking Sample Locations

It will be left to the discretion of the Field Team Leader (FTL) to determine whether sample locations will be surveyed and staked prior to sampling or if locations will be surveyed after sampling. Northing and easting coordinates are available for the preremediation and postremediation sampling and are summarized in Appendix B. As discussed in Section 4, preremediation sample locations, based on Figure 4-1, will be identified by the sampling team in the field. For surveyed and staked locations, sampling will be performed in accordance with the requirements set forth in MCP-227, *Sampling and Analysis Process for Environmental Management Funded Activities*.

6.2 Sampling Requirements

Soil sample retrieval will be performed in accordance with TPR-61, *Soil Sampling* (INEEL 1999b). The concrete pad will be sampled by collecting a core. To ensure that proper jars and preservatives are used, the field team members will use the field guidance forms (described in Section 7.1.2) from the SMO. Samples will be deposited directly into a wide-mouth glass jar and preserved at 4°C during storage and transportation. Sample analysis will occur before expiration of the holding time for lead, which is six months for soil samples.

Soil samples will be collected with steel trowels, spoons, or shovels. The identification of the most appropriate tool will be left to the discretion of the FTL, as will be the choice of using dedicated sampling equipment or reusing equipment that will be decontaminated, and the selection of the method of decontamination. Decontamination procedures for any of the phases of sampling activities may include using a paper towel to wipe off soil residue on a given sampling tool.

6.3 X-Ray Fluorescence Spectrometry

There are two manners that the Field Portable XRF instrument is operated, they are an in situ or intrusive mode. When operated in the in situ mode, the probe window is placed in direct contact with the soil surface to be analyzed. When operated in the intrusive mode, a soil sample must be collected, prepared, and placed in a sample cup. Use of the XRF will begin in the remediation phase and use the in situ mode. The XRF will also be used for verification analysis in the postremediation phase and will employ the intrusive mode. Field sampling procedures for the field portable x-ray fluorescence spectrometer (FPXRF) consist of following the instrument manufacturer's sample preparations and instrument operation protocols for the specific instrument in each of the sample locations. The manufacturer's maintenance and decontamination procedures for the instrument will be followed.

As a general procedure for in situ instrument operation, EPA Method 6200 states that:

> "For in situ analysis, one requirement is that any large or nonrepresentative debris be removed from the soil surface before analysis. This debris includes rocks, pebbles, leaves, vegetation, roots, and concrete. Another requirement is that the soil surface be as smooth as possible so that the probe window will have good contact with the surface. This may require some leveling of the surface with a stainless-steel trowel. During the study conducted to provide data for this method, this modest amount of sample preparation was found to take less than 5 minutes per sample location. The last requirement is that the soil or sediment not be saturated with water. Manufacturers state that their FPXRF instruments will perform adequately for soils with moisture contents of 5 to 20 percent but will not perform well for saturated soils, especially if ponded water exists on the surface. Another recommended technique for in situ analysis is to tamp the soil to increase soil density and compactness for better repeatability and representativeness. This condition is especially important for heavy element analysis, such as barium. Source count times for in situ analysis usually range from 30 to 120 seconds, but source count times will vary among instruments and depending on detection limits."

For operation in the intrusive mode, the EPA Method 6200 and the manufacturer's protocol will be followed, as applicable, to ensure a high correlation between the XRF and laboratory data. The method will be documented and approved by the project team prior to use in the field. The method will be placed in the field log book for this site.

Detection limits for this analytical technique depend on several factors: the analyte of interest, the type of detector used, the type of excitation source, the strength of the source, count times used to irradiate the sample, physical matrix effects, and interelement spectral interferences. The field-based method detection limits for six instruments are presented in Table 4 of EPA Method 6200, *Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*. The detection limits for lead for three of the instruments shown in the table ranged from 40 to 45 mg/kg, which is below the FRG of 400 mg/kg.

6.4 Radiological Shipping Screen

CFA-10 is not a radiologically contaminated site. Therefore, no radiological shipping screen will be required.

6.5 Handling and Disposition of Remediation-Derived Waste

- Analytical results from the preremediation sampling activities will be used to perform a hazardous waste determination in accordance with 40 Code of Federal Regulations (CFR) 262.11 and Waste Generator Services (WGS) MCPs (INEEL 1999a). In addition, these results will dictate proper management and timely disposal of the waste streams. This section describes the management of all wastes generated during the remedial action sampling at the Transformer Yard (CFA-10). The RD/RA Work Plan (DOE-ID 2000d) identifies the types and volumes of wastes being generated.

A summary of the waste streams expected to be generated during the remedial action sampling activities is presented in Table 6-1, which further provides a description of the waste streams, identifies the waste type, and gives an estimate of the volume for each waste type.

6.6 Characterization

In accordance with Resource Conservation and Recovery Act (RCRA) (40 CFR 261.2), all wastes shown in Table 6-1 are solid wastes. The RCRA defines solid waste as a "solid, liquid, or contained gas discarded by being abandoned, recycled, or is inherently waste-like." In compliance with RCRA (40 CFR 262.11), a hazardous waste determination that includes a detailed chemical and physical analysis of representative samples of the waste and/or process knowledge must be prepared for all solid wastes. Preremediation sample analysis will be used to support the hazardous waste determination.

6.7 Hazardous Waste

The hazardous waste generated by remedial action sampling activities, noted in Table 6-1, consists of lead-contaminated personal protective equipment (latex gloves, rubber work gloves, booties, Tyvek coveralls, duct tape, respiratory protective air filters, etc.), nonrecyclable sampling materials (sample jars, plastic bags, sampling tools, etc.), nonrecyclable decontamination materials (paper towels, cleaning cloths, cleaning pads, plastic sheeting, etc.), and site soil tasked for removal. All hazardous wastes will be evaluated as required by RCRA regulations, properly containerized, stabilized as required (soil), and transported to an off-INEEL TSDF in compliance with U.S. Department of Transportation's (DOT's) regulations.

6.8 Packaging

Before transporting hazardous waste or offering hazardous waste for transportation off-INEEL, the generator must package the waste in accordance with the applicable DOT regulations on packaging under 49 CFR Parts 173, 178, and 179 (40 CFR 262.30). The RD/RA subcontractor will contact WGS to determine the specific packaging requirements for the off-INEEL shipment to the TSDF of personal protective equipment and sample soil.

6.9 Labeling

Before transporting hazardous waste or offering hazardous waste for transportation off-INEEL, the generator must label each package in accordance with the applicable DOT regulations on packaging under 49 CFR Part 172 (40 CFR 262.31). The RD/RA subcontractor will contact WGS to determine the specific labeling requirements for lead-contaminated soil and any other materials contaminated by site soil designated for off-INEEL shipment to the TSDF.

Table 6-1. Expected Waste Generated from Sampling Activities.

Waste Type	Waste Description	Estimated Volume
Administrative (paper, packaging, bottles, etc.)	Nonconditional industrial	0.03 m^3 (1 ft^3)
Personal Protective Equipment (gloves, booties, Tyvek coveralls, used sampling materials, decontamination materials, etc.)	Hazardous	0.03 m^3 (1 ft^3)
Sample Waste	Hazardous	0.3 m^3 (10 ft^3)

6.10 Storage and Inspection

Analytical results from the preremediation sampling activities will be used to perform a hazardous waste determination in accordance with 40 CFR 262.11 and WGS MCPs (INEEL 1999a) and will dictate proper management and timely disposal of the waste streams. It is anticipated that there will be no requirements for long-term storage of any material at the site.

7. DOCUMENTATION MANAGEMENT AND SAMPLE CONTROL

Section 7.1 summarizes document management and sample control. Documentation includes field logbooks used to record field data and sampling procedures, photographic documentation, chain-of-custody forms, and sample container labels. Section 7.2 outlines the sample handling and discusses chain-of-custody, radioactivity screening, and sample packaging for shipment to the analytical laboratories.

7.1 Documentation

The Field Team Leader will be responsible for controlling and maintaining all field documents and records, and for ensuring that all required documents will be submitted to the Environmental Restoration Administrative Records and Document Control Office at the conclusion of the project. Record keeping will be conducted in accordance with MCP-557, *Managing Records* (INEEL 1998b).

Sample documentation, shipping, and custody procedures for this project are based on EPA-recommended procedures that emphasize careful documentation of sample collection and sample transfer. The appropriate information pertaining to each sample will be recorded in accordance with:

- MCP-231, *Logbooks* (INEEL 1998a)
- MCP-244, *Chain-of Custody, Sample Handling, and Packaging for CERCLA Activities* (INEEL 1999a)
- The QAPjP (DOE-ID 2000c).

All personnel involved with handling, managing, or disposing samples will be trained to MCP-2864, *Sample Management,* and all samples will be disposed in accordance with MCP-2864.

A document action request is required when field conditions dictate making any change (i.e., requiring additional analyses to meet appropriate waste acceptance criteria) to this FSP, the project HASP, or project procedures. If necessary, a document action request will be executed in accordance with MCP-230, *Environmental Restoration Document Control Interface.*

All information recorded on project documentation will be made in permanent ink. All errors will be corrected by drawing a single line through the error and entering the correct information, and all corrections will be initialed and dated. In addition, photographs will be taken to document field sampling activities.

7.1.1 Sample Container Labels

Waterproof, gummed labels generated from the IEDMS database will display information such as the sample ID number, the name of the project, sample location, depth, and requested analysis type. Label information will be completed and placed on the containers before collecting the sample in the field. The sample date, time, preservative used, field measurements of hazards, and the sampler's initials will be recorded during field sampling.

7.1.2 Field Guidance Forms

Field guidance forms, provided for each sample location, will be generated from the IEDMS database to ensure unique sample numbers. These forms are used to facilitate sample container documentation and organization of field activities and contain information regarding the following:

- Media
- Sample ID numbers
- Sample location
- Aliquot ID
- Analysis type
- Container size and type
- Sample preservation.

7.1.3 Field Logbooks

In accordance with the Administrative Records and Document Control format, field logbooks will be used to record information necessary to interpret the analytical data. All field logbooks will be controlled and managed according to MCP-231, *Logbooks* (INEEL 1998a). The FTL, or designee, will periodically inspect the field logbooks to ensure that they are being maintained in accordance with the referenced MCP. Once sample locations have been surveyed, the northing and eastings will be incorporated in the field logbook. The field logbooks will be submitted to the project files at the completion of field activities.

7.1.3.1 Sample Logbooks. The field teams will use the sample logbooks. Each sample logbook will contain information such as:

- Physical measurements (if applicable)
- All quality assurance/quality control samples
- Shipping information (e.g., collection dates, shipping dates, cooler ID number, destination, chain-of-custody number, name of shipper).

7.1.3.2 Field Team Leader's Daily Logbook. A project logbook maintained by the FTL will contain a daily summary of the following:

- All the team activities
- Problems encountered
- Visitors
- List of work site contacts.

This logbook will be signed and dated at the end of each day's sampling activities.

7.1.3.3 Field Instrument Calibration/Standardization Logbook. A logbook containing records of calibration data will be maintained for each piece of equipment requiring periodic calibration or standardization. This logbook will contain logsheets to record the date, time, method of calibration, and instrument ID number.

7.2 Sample Equipment and Handling

7.2.1 Sample Equipment

This subsection contains a list of the additional equipment and supplies necessary to perform the sampling activities described in Section 2 of this FSP. The list, while as extensive as possible, is not exhaustive and should only be used as a guide. The equipment and supplies specified in the Transformer Yard HASP (INEEL 2000) and the project-specific decontamination plan (CFA-10 RD/RA Work Plan, Section 5.10), or other remedial action activity items (Field Team Leader logbook, pens, work table, etc.) available for the sampling activity are not included in this subsection.

Field sampling equipment and supplies:

- Field portable x-ray fluorescence spectrometer
- Tape measure (minimum 46 m [150 ft] length)
- Surveyor flags (20)
- String (305 m [1,000 ft])
- Stainless steel trowels (30)
- Sample bottles (30)
- Coolers (one)
- Blue ice (four)
- Sampling/shipping logbook (one)
- Black ink markers (four)
- Masking tape (two rolls)
- Bubble wrap (two rolls)
- Vermiculite (one bag)
- Sample documentation (five chain-of-custody forms, two rolls of custody seals, 30 bottle labels and tags, five laboratory traffic reports, and five shipping forms)
- Ziplock bags (30)

- Wrapping tape (three rolls)
- Strapping tape (two rolls)
- Shipping address labels for the cooler (five)
- Clear plastic shipping envelope for cooler shipping forms (three)
- Name, address, telephone number, and contact person for the analytical laboratory.

7.2.2 Sample Containers

Tables 3.1 and 3.2 in the QAPjP (DOE-ID 2000c) include identification of the container volumes, types, holding times, and preservative requirements that apply to all solid and liquid samples being collected under this FSP. All containers will be precleaned (usually certified by the manufacturer) with the appropriate EPA-recommended cleaning protocols for the bottle type and sample analyses. Extra containers will be available in case of breakage, contamination, or if additional samples are collected. Prior to use, preprinted labels with the name of the project, sample identification number, location, depth, and requested analysis will be affixed to the sample containers.

7.2.3 Sample Preservation

Preservation of liquid samples will be performed consistent with the QAPjP (DOE-ID 2000c). If cooling is required for preservation, the temperature will be checked periodically prior to shipment to certify adequate preservation for those samples requiring temperatures at 4°C (39°F) for preservation. Ice chests (coolers) containing frozen reusable ice will be used to chill samples, if required, in the field after sample collection.

7.2.4 Chain-of-Custody Procedures

The chain-of-custody procedures will be followed per MCP-244, *Chain-of-Custody, Sample Handling, and Packaging for CERCLA Activities* (INEEL 1999a) and the QAPjP (DOE-ID 2000c). Sample bottles will be stored in a secured area accessible only to the field team members.

7.2.5 Transportation of Samples

Samples will be shipped in accordance with the regulations issued by the DOT (49 CFR Parts 171 through 178) and EPA sample handling, packaging, and shipping methods (40 CFR 262). All samples will be packaged in accordance with the requirements set forth in MCP-244, *Chain-of Custody, Sample Handling, and Packaging for CERCLA Activities* (INEEL 1999a).

7.2.5.1 Custody Seals. Custody seals will be placed on all shipping containers to ensure that tampering or unauthorized opening will not compromise sample integrity. The seal will be attached in such a way that opening the container requires that the seal be broken. Clear plastic tape will be placed over the seals to ensure that the seals are not damaged during shipment. Seals will be affixed to containers before the samples leave the custody of the sampling personnel.

7.2.5.2 Onsite and Offsite Shipping. An onsite shipment is any transfer of material within the perimeter of the INEEL. Work site-specific requirements for transportation of samples within work site boundaries, in addition to those required by the shipping/receiving department, will be followed. Shipment within the INEEL's boundaries will conform to DOT requirements, as stated in 49 CFR.

Although not anticipated, any offsite sample shipment will be coordinated with INEEL Packaging and Transportation personnel, as necessary, and will conform to all applicable DOT requirements.

7.3 Documentation Revision Requests

Revisions to this document will follow MCP-230, *Environmental Restoration Document Control Center Interface*.

8. REFERENCES

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